

We claim:

1 1. A method for assaying angiogenesis *ex vivo*, said method comprising the steps
2 of:

3 (a) embedding a three-dimensional mammalian tissue sample in a matrix, wherein
4 the tissue sample has at least one cut surface exposing blood vessels;

5 (b) supplying to the embedded tissue sample a medium that supports the growth of
6 the tissue sample;

7 (c) incubating the embedded tissue sample in the medium for a time sufficient to
8 allow angiogenic vessels, if any, to grow into the matrix surrounding the tissue
9 sample; and

10 (d) observing or measuring the angiogenic vessels, if any, that grow into the matrix
11 surrounding the tissue sample.

1 2. A method as recited in Claim 1, wherein the medium comprises a serum-free
2 medium that supports the growth of the tissue sample; wherein the medium contains
3 substantially no exogenous angiogenesis-enhancing factors and substantially no exogenous
4 angiogenesis-suppressing factors.

1 3. A method as recited in Claim 1, wherein the medium comprises serum.

1 4. A method as recited in Claim 1, wherein the medium comprises an angiogenesis-
2 enhancing factor.

1 **5.** A method as recited in Claim 4, wherein the angiogenesis-enhancing factor is
2 selected from the group consisting of platelet-derived growth factor, vascular endothelial growth
3 factor, epidermal growth factor, fibroblast growth factor, and transforming growth factor β .

1 **6.** A method as recited in Claim 1, wherein the matrix comprises fibrin.

1 **7.** A method as recited in Claim 1, wherein the matrix comprises collagen.

1 **8.** A method as recited in Claim 1, wherein the matrix comprises gelatin.

1 **9.** A method as recited in Claim 1, wherein the matrix comprises agarose, agar,
2 alginate, or silica gel.

1 **10.** A method as recited in Claim 1, wherein the matrix comprises Matrigel.

1 **11.** A method as recited in Claim 1, wherein the tissue sample is a tumor fragment.

1 **12.** A method as recited in Claim 1, wherein the tissue sample is not a tumor
2 fragment, and wherein the tissue sample is not an isolated segment of an artery or vein.

1 **13.** A method as recited in Claim 1, additionally comprising the step of supplying an
2 additional factor to the embedded tissue sample, and measuring the difference in angiogenesis
3 for the tissue sample as compared to the angiogenesis of an otherwise identical and otherwise
4 identically-treated control tissue sample that is not supplied with the factor; whereby the
5 difference in observed angiogenesis is a measure of the angiogenic enhancement or angiogenic
6 suppression characteristics of the supplied factor.

- 1 **14.** A method for growing a tissue *ex vivo*, said method comprising the steps of:
- 2 **(a)** embedding a three-dimensional mammalian tissue sample in a matrix, wherein
- 3 the tissue sample has at least one cut surface exposing blood vessels;
- 4 **(b)** supplying to the embedded tissue sample a medium that supports the growth of
- 5 the tissue sample; and
- 6 **(c)** incubating the embedded tissue sample in the medium for a time sufficient to
- 7 allow angiogenic vessels to grow into the matrix surrounding the tissue sample;
- 8 and to allow the number of cells in the tissue to proliferate, so that the tissue's
- 9 suitability for transplant is improved.
- 1 **15.** A method as recited in Claim 14, wherein the medium comprises serum.
- 1 **16.** A method as recited in Claim 14, wherein the medium comprises an
- 2 angiogenesis-enhancing factor.
- 1 **17.** A method as recited in Claim 16, wherein the angiogenesis-enhancing factor is
- 2 selected from the group consisting of platelet-derived growth factor, vascular endothelial growth
- 3 factor, epidermal growth factor, fibroblast growth factor, and transforming growth factor β .
- 1 **18.** A method as recited in Claim 14, wherein the matrix comprises fibrin.
- 1 **19.** A method as recited in Claim 14, wherein the matrix comprises collagen.
- 1 **20.** A method as recited in Claim 14, wherein the matrix comprises gelatin.

1 **21.** A method as recited in Claim 14, wherein the matrix comprises agarose, agar,
2 alginate, or silica gel.

1 **22.** A method as recited in Claim 14, wherein the matrix comprises Matrigel.

1 **23.** A method as recited in Claim 14, wherein the tissue sample is selected from the
2 group consisting of skin tissue, parathyroid tissue, thyroid tissue, pituitary tissue, adrenal tissue,
3 pancreas tissue, cardiac muscle tissue, skeletal muscle tissue, retina tissue, kidney tissue, liver
4 tissue, and prostate tissue.

1 **24.** A method as recited in Claim 14, additionally comprising the subsequent step of
2 transplanting the incubated embedded tissue sample with angiogenic vessels into a host in need
3 of such a transplant.

1 **25.** A method as recited in Claim 14, wherein said incubating step is conducted for
2 a time sufficient for the mass of the tissue to increase by at least about 25%.

1 **26.** A method as recited in Claim 25, additionally comprising the subsequent step of
2 transplanting the incubated embedded tissue sample with angiogenic vessels into a host in need
3 of such a transplant.

1 **27.** A tissue with angiogenic vessels produced by the method of Claim 14.

1 **28.** A tissue with angiogenic vessels produced by the method of Claim 15.

1 **29.** A tissue with angiogenic vessels produced by the method of Claim 16.

1 **30.** A tissue with angiogenic vessels produced by the method of Claim 17.

- 1 **31.** A tissue with angiogenic vessels produced by the method of Claim 18.
- 1 **32.** A tissue with angiogenic vessels produced by the method of Claim 19.
- 1 **33.** A tissue with angiogenic vessels produced by the method of Claim 20.
- 1 **34.** A tissue with angiogenic vessels produced by the method of Claim 21.
- 1 **35.** A tissue with angiogenic vessels produced by the method of Claim 22.
- 1 **36.** A tissue with angiogenic vessels produced by the method of Claim 23.
- 1 **37.** A tissue with angiogenic vessels produced by the method of Claim 25.